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The Resources Agency
DEPARTMENT OF FISH AND GAME

STANDING STOCKS OF FISHES IN SECTIONS OF BIG GRIZZLY CREEK PLUMAS COUNTY, 1988

by

Charles J. Brown

Bay-Delta and Special
Water Projects Division

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INTRODUCTION

The Department of Water Resources (DWR) initiated an instream flow program in 1976 to identify streams that would benefit from flow enhancement, to assess instream values, and identify actions such as habitat manipulation that could enhance these streams. The Northern District of DWR selected Big Grizzly Creek below Lake Davis (Figure 1) as one of the streams to study under this program.

Previous sampling effort on Big Grizzly Creek has been conducted by Department of Fish and Game (DFG) biologists. Initial estimates of rainbow trout (Oncorhynchus mykiss) populations were made by the DFG in 1976 (Brown 1976). The DFG also surveyed the creek in 1981 and 1986 to estimate standing stocks of brown trout (Salmo trutta) and rainbow trout in selected stations (Bumpass et al. 1989).

The purpose of the effort reported here is to sample trout in stations established in 1986 to set baseline conditions with which future changes in seasonal stream flow or other elements of habitat would be compared. A report discussing twenty-five years of fisheries studies on Big Grizzly Creek will be prepared in the year 2001.

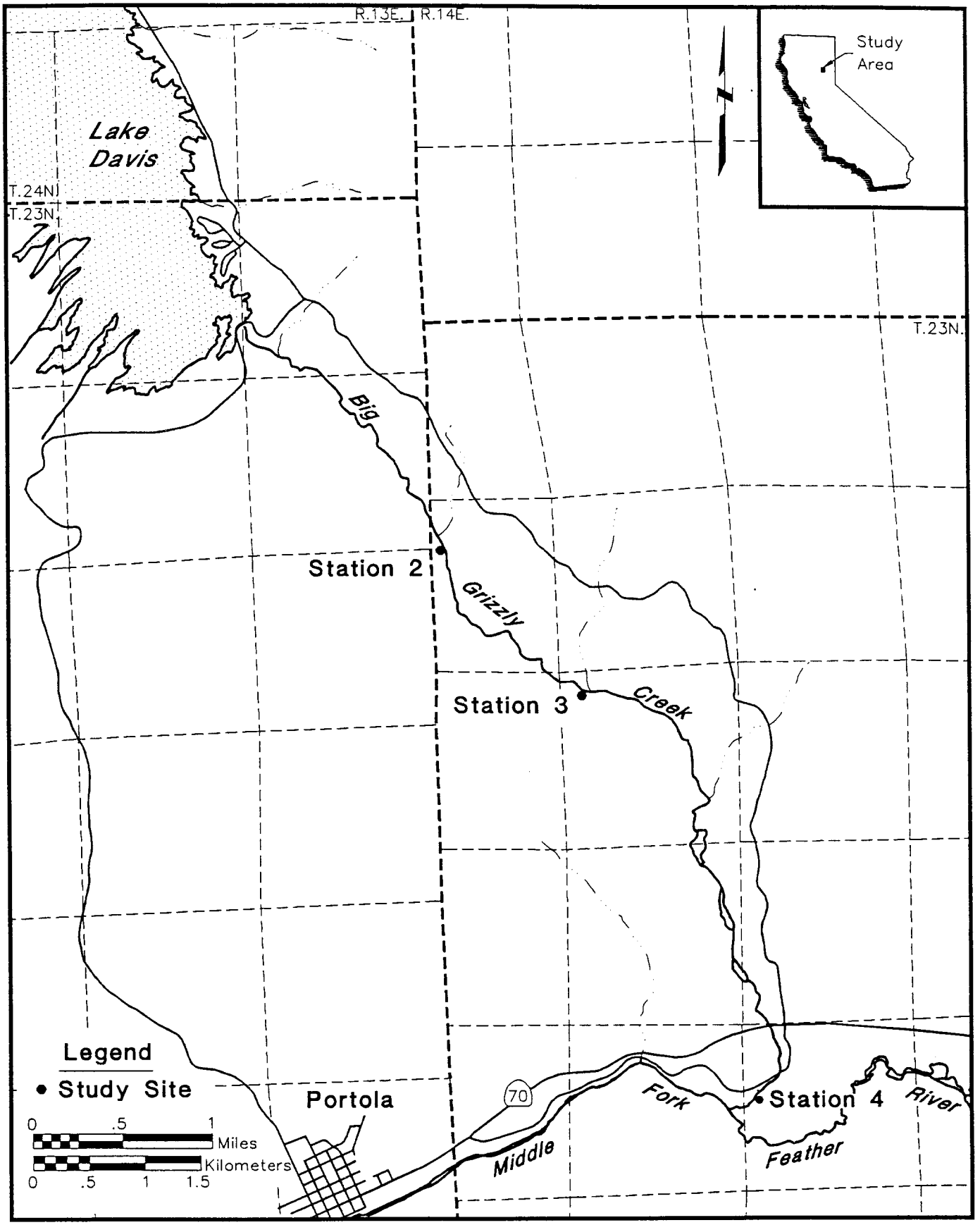

Figure 1. Stations sampled to estimate standing crop of trout in Big Grizzly Creek, 1988.

METHODS

Standing stocks of fishes were estimated in three fish population stations in Big Grizzly Creek (Figure 1) in Plumas County. Fish were sampled in riffles and small pools. Stations varied in length from 47.6 to 56.4 meters, according to the availability of suitable sampling water (Appendix 1). The length, average width, and average depth of each section were measured with a cloth tape. Fish were captured with a battery-powered backpack electroshocker (Smith-Root, Type VII) in stream sections blocked by seines. Captured fish were removed from the net-enclosed section on each pass.

Standing stock estimates were developed using the two-count method of Seber and LeCren (1967) or the multiple-pass method of Leslie and Davis (1939) with limits of confidence computed using a formula proposed by DeLury (1959).

The fork length (FL) of each fish was measured to the nearest millimeter. The weights of rainbow trout and brown trout were determined by displacement. Weights were also measured for Sacramento sucker (Catostomus occidentalis) and speckled dace (Rhinichthys osculus).

Scales were dry mounted between microscope slides and their images were projected on a NCR microfiche reader at a magnification of 42X. Scale measurements for the calculation of growth were recorded to the nearest millimeter along the anterior radius of the anterior-posterior axis of the scale.

Geometric mean functional regressions were used to describe the body-scale and length-weight relationships (Ricker 1975). Estimation of true mean growth rate was calculated using methods of Ricker (op. cit.).

Distribution of all fish caught is listed according to location. Standing crops of rainbow trout, brown trout, and nongame fishes were calculated for individual stations. Age, growth, and mean individual growth were calculated for rainbow trout and brown trout. Age and catch percentages as well as length and weight relationships were determined for rainbow trout and brown trout. The coefficient of condition and 95 percent confidence intervals were calculated for rainbow trout and brown trout.

RESULTS

Distribution

Rainbow trout were caught in each station. Brown trout, Sacramento sucker, and carp (Cyprinus carpio) were only caught in station 4, the lowest station sampled. Speckled dace were caught in station 3 (Table 1).

TABLE 1. Distribution of Fishes in Sections of Big Grizzly Creek Plumas County, 1988.

	Station Number		
	2	3	4
Distance below Grizzly Valley Dam (km)	3.2	4.8	9.7
Brown trout			X
Rainbow trout	X	X	X
Speckled dace		X	
Sacramento sucker			X
Carp			X

Standing Crop

Rainbow trout were the most common game fish caught in Big Grizzly Creek. Biomass averaged 5.6 g/m^2 in three stations (Table 2). Catchable rainbow trout ($\geq$ 127 mm FL) biomass averaged 5.3 g/m^2. We found brown trout in only one station. Biomass in that station was 1.7 g/m^2 (Table 3). Biomass was estimated for Sacramento suckers but not for other nongame fishes (Table 4).

TABLE 2. Estimate of Rainbow Trout Standing Crop in Big Grizzly Creek, Plumas County, 1988.

Distance Below Grizzly Valley Dam (km)	Population Estimate	95% Confidence Interval	Biomass (g/m^2)	Estimate of Catchable Trout ($\geq$ 127 mm FL)	Biomass of Catchable Trout (g/m^2)
3.2	27	24-35	5.1	16	4.7
4.8	58	48-74	7.6	39	7.2
9.7	21	10-79	4.0	13	3.9

TABLE 3. Estimate of Brown Trout Standing Crop in Big Grizzly Creek, Plumas County, 1988.

Distance Below Grizzly Valley Dam (km)	Population Estimate	95% Confidence Interval	Biomass (g/m^2)	Estimate of Catchable Trout ($\geq$ 127 mm FL)	Biomass of Catchable Trout (g/m^2)
3.2	0	0	0	0	0
4.8	0	0	0	0	0
9.7	11	10-16	1.7	4	1.5

TABLE 4. Estimate of Standing Crop of Nongame Fishes in Big Grizzly Creek, Plumas County, 1988.

Distance Below Grizzly Valley Dam (km)	Species	Population Estimate	95% Confidence Interval	Biomass(g/m^2)
4.8	Speckled dace	1	-	-
9.7	Sacramento sucker	8	8-9	3.9
9.7	Carp	3	3-8	-

Length and Weight

Age group 0+ rainbow trout represented 37 percent of the 73 rainbow trout caught. Ages 1+ and 2+ comprised 56 percent and 7 percent respectively (Figure 2). Age group 0+ brown trout made up 60 percent of the 10 brown trout caught. Ages 1+ and 2+ comprised 30 percent and 10 percent respectively (Figure 3) (Appendices 2 and 3).

The relationship between fork length (L) and weight (W) of rainbow trout for Big Grizzly Creek is:

$Log_{10}W = -4.7 + 2.9\ Log_{10}L$

$r^2 = 0.99$

N = 73 (Figure 4 and Appendix 4)

The same relationship for brown trout is:

$Log_{10}W = -4.7 + 2.9\ Log_{10}L$

$r^2 = 0.99$

N = 10 (Figure 5 and Appendix 5)

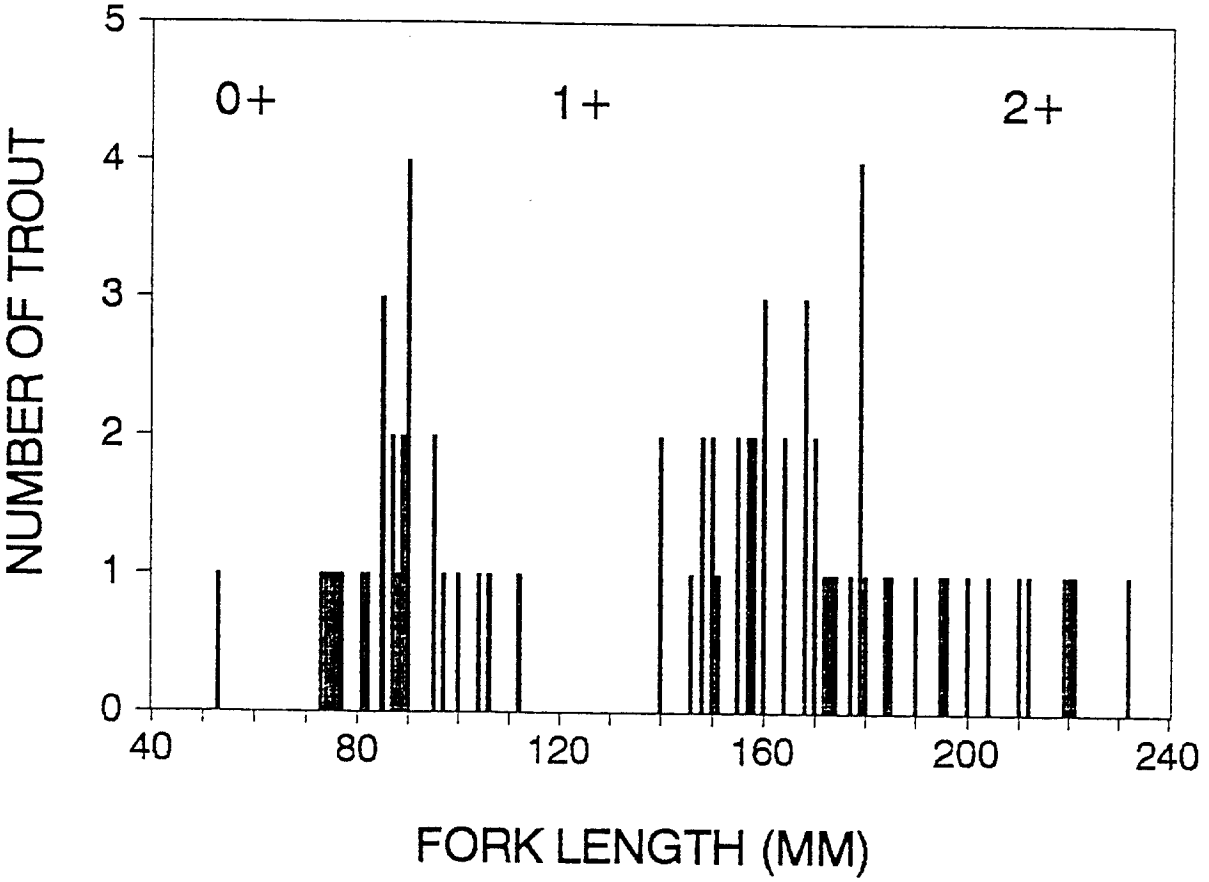

FIGURE 2. Length, observed frequency, and age of rainbow trout caught in Big Grizzly Creek, Plumas County, 1988.

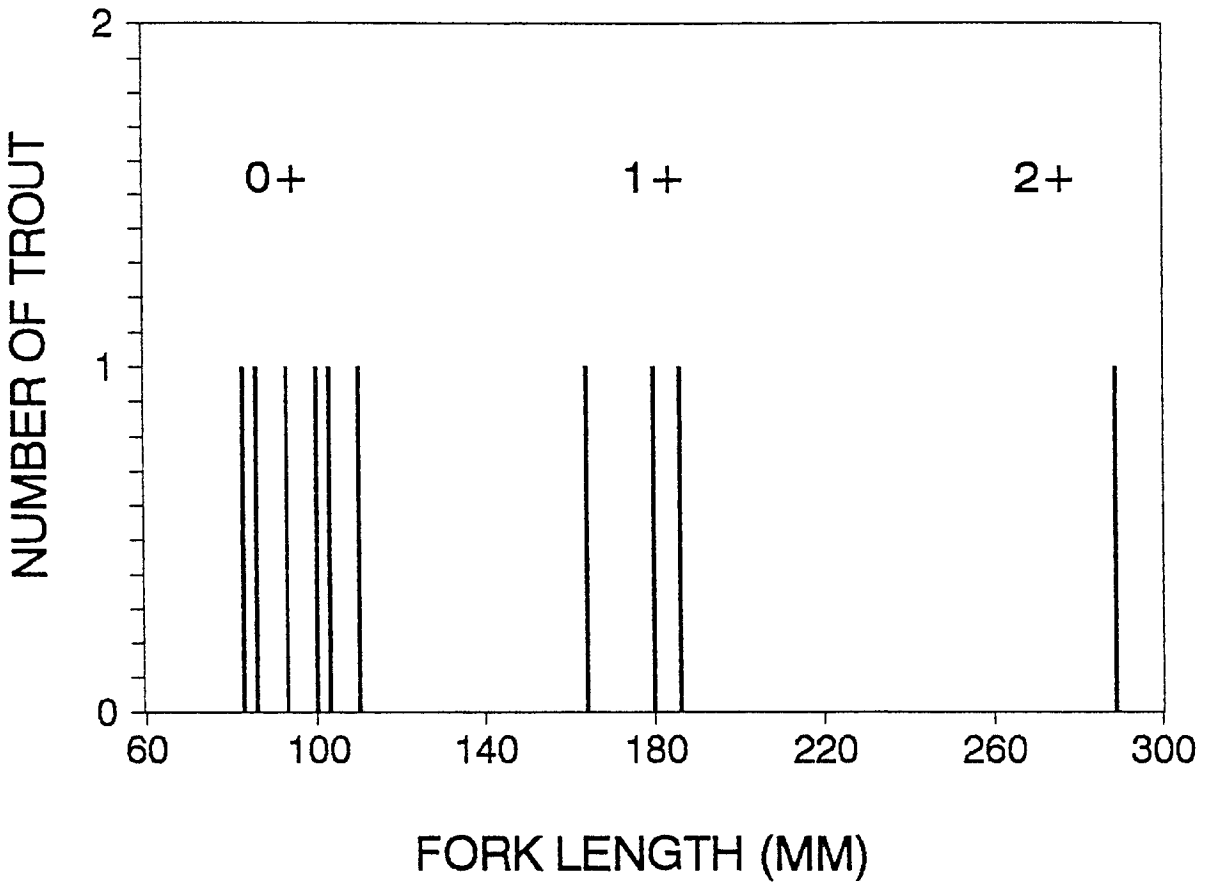

FIGURE 3. Length, observed frequency, and age of brown trout caught in Big Grizzly Creek, Plumas County, 1988.

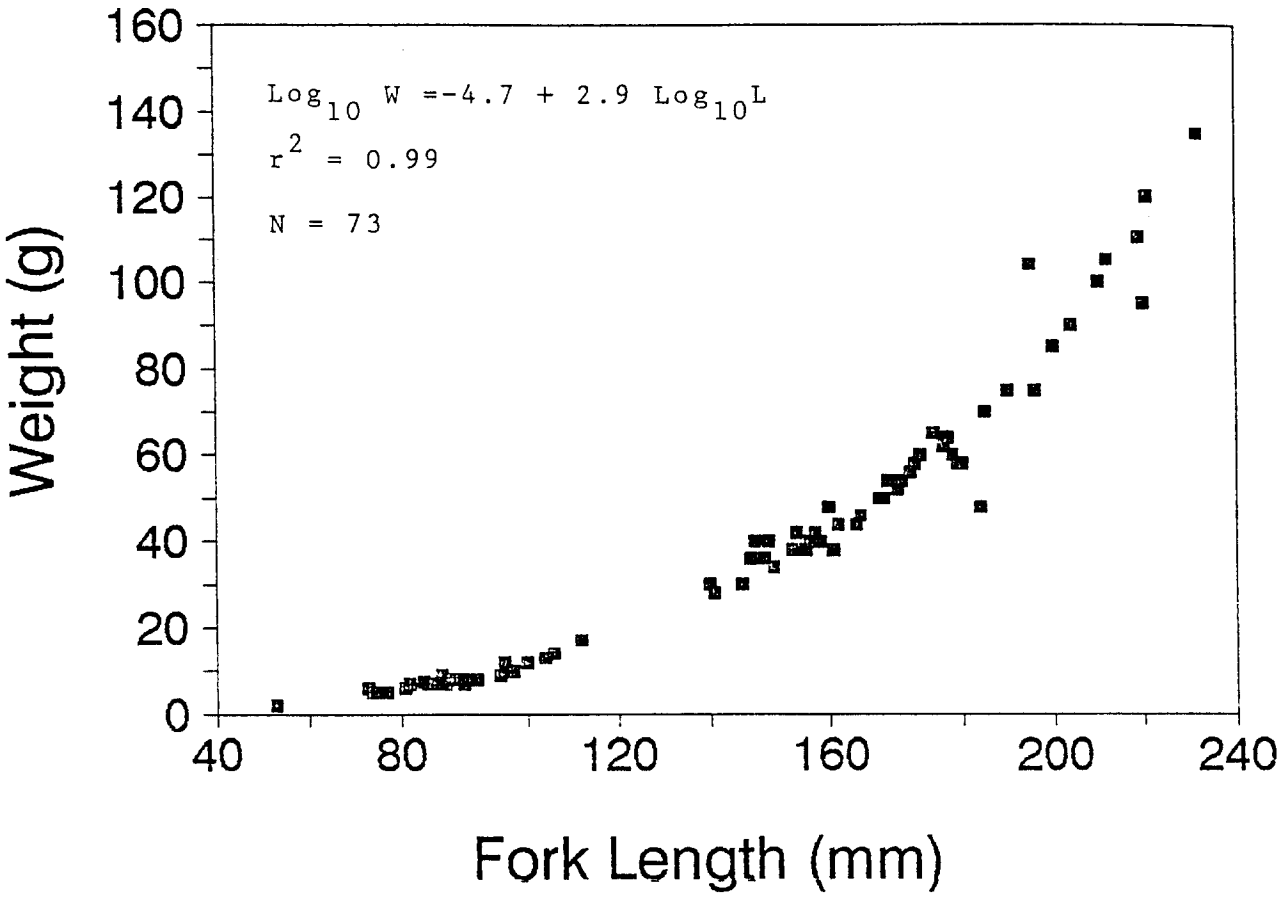

FIGURE 4. The relationship between length and weight of rainbow trout caught in sections of Big Grizzly Creek, 1988.

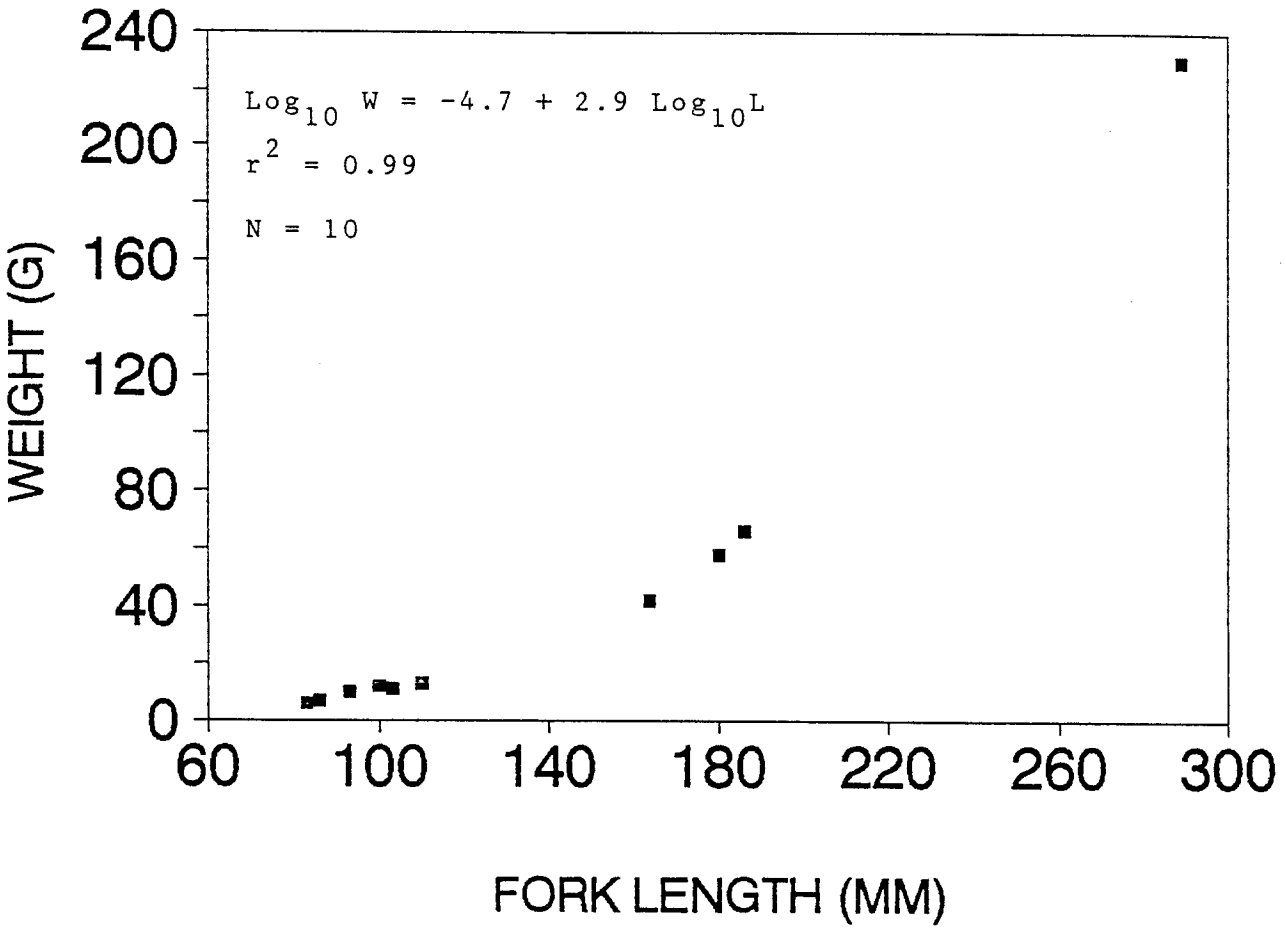

FIGURE 5. The relationship between length and weight of brown trout caught in sections of Big Grizzly Creek, 1988.

Age and Growth

The formula L = -2.1 + 0.2 S describes the relationship between the fork length (L) and enlarged scale radius (S) of 64 rainbow trout caught in Big Grizzly Creek. The coefficient of correlation (r^2) is 0.53. No relationship was developed for brown trout because only three scales could be successfully read.

Instantaneous population growth for rainbow trout was greater than instantaneous mean individual growth (Table 5). Growth rates were not calculated for brown trout.

TABLE 5. Growth Rates for Rainbow Trout Caught in Big Grizzly Creek, 1988.

	Population Growth			Mean Individual Growth		
Age	Length Interval (mm)	Difference of Natural Logarithms	Instantaneous Growth Rate Gx	Length Interval (mm)	Difference of Natural Logarithms	Instantaneous Growth Rate Gx
1-2	116-186	0.472	1.416	121-186	0.432	1.296

Age 1+ rainbow trout averaged 173 mm fork length and age 2+ rainbow trout averaged 235 mm fork length (Table 6).

TABLE 6. Calculated Fork Length of Rainbow Trout from Big Grizzly Creek, 1988.

Age	Number of Fish	Length at Capture	Length at Successive Annulus 1	2
1	57	173	116	
2	7	235	121	186
Number of back-calculations			64	7
Weighted means (mm)			117	186
Increments (mm)			117	69

Coefficient of Condition

The average coefficient of condition for 73 rainbow trout was 1.0985 and 1.0610 for 10 brown trout. 0+ and 1+ rainbow trout had slightly higher coefficients of condition than brown trout of the same age groups (Table 7).

TABLE 7. Condition of Rainbow Trout and Brown Trout in Big Grizzly Creek, 1988

Age Group	Number of Fish	Coefficient of Condition	95% Confidence Interval
Rainbow trout			
0+	27	1.1661	0.9304-1.4018
1+	41	1.0679	0.8861-1.2497
2+	5	1.0304	0.7177-1.3431
Combined	73	1.0985	0.8661-1.3359
Brown trout			
0+	6	1.0961	0.9052-1.2870
1+	4	0.9908	0.9318-1.0498
Combined	10	1.0610	0.9052-1.2478

LITERATURE CITED

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APPENDIX 1

PERMANENT FISH POPULATION STATIONS FOR
BIG GRIZZLY CREEK, PLUMAS COUNTY
SEPTEMBER, 1988

Station 2 (IFN Station) - Station 2 is 3.2 stream km below Grizzly Valley Dam. The site located at UTM 176 156 at an elevation of 1610 n MSL. The upper end of the station is a steep rapid (55%) followed by two deep pools (45%) seperated by short rapids. The substrate is mostly rubble (60%), boulder (20%), gravel (10%), with areas of sand (10%) in the pools. The station is 53.7 m long with a surface area of 231 m^2 at 0.56 cms.

Station 3 (3-Mile Station) - Station 3 is located 4.8 km downstream from Grizzly Valley Dam at an elevation of 1549 m MSL at UTM 189 141. The station begins in a steep rapid followed by more gradual rapids (75%) with pocket pools and two larger pools (25%) near the lower end. Substrate is boulder (65%), rubble (20%), sand (10%), and gravel (5%). The station is 56.4 m long and has a surface area of 305 m^2 at 0.56 cms.

Station 4 (6-Mile Station) - Station 4 is located 9.7 km below Grizzly Valley Dam and 0.2 km above the confluence with the Middle Fork Feather River at an elevation of 1488 m MSL. It is located at UTM 205 106. The station begins in a rapid just above a large 0.7 m deep pool (33%) followed by several riffle areas (67%) and shallow pools with undercut banks and overhanging grass clumps. Substrate is rubble (10%), gravel (75%), bedrock (10%), and mud (5%). The station is 47.6 m long with a surface area of 262 m^2 at 0.56 cms.

APPENDIX 2

LENGTH AND NUMBER OF RAINBOW TROUT
CAUGHT IN BIG GRIZZLY CREEK, 1988

Fork Length (mm)	Frequency of Occurrence	Fork Length (mm)	Frequency of Occurrence
53	1	157	2
73	1	158	2
74	1	160	3
75	1	164	2
76	1	168	3
77	1	170	2
81	1	172	1
82	1	173	1
85	3	174	1
87	2	177	1
88	1	179	4
89	2	180	1
90	4	184	1
95	2	185	1
97	1	190	1
100	1	195	1
104	1	196	1
106	1	200	1
112	1	204	1
140	2	210	1
146	1	212	1
148	2	219	1
150	2	220	1
151	1	221	1
155	2	232	1

APPENDIX 3

LENGTH AND NUMBER OF BROWN TROUT CAUGHT IN BIG GRIZZLY CREEK, 1988.

Fork Length (mm)	Frequency of Occurrence
83	1
86	1
93	1
100	1
103	1
110	1
164	1
180	1
186	1
289	1

APPENDIX 4

LENGTH AND WEIGHT OF RAINBOW TROUT CAUGHT IN BIG GRIZZLY CREEK, 1988.

Fork Length (mm)	Displacement (ml)	Fork Length (mm)	Displacement (ml)
53	2	157	38
73	6	157	40
74	5	158	42
75	5	158	40
76	5	160	48
77	5	160	38
81	6	160	44
82	7	164	44
85	8	164	46
85	7	168	50
85	7	168	50
87	9	168	54
87	7	170	52
88	8	170	54
89	8	172	56
89	8	173	58
90	8	174	60
90	7	177	65
90	8	179	62
90	8	179	64
95	9	179	60
95	12	179	58
97	10	180	58
100	12	184	48
104	13	185	70
106	14	190	75
112	17	195	104
140	30	196	75
140	28	200	85
146	30	204	90
148	36	210	100
148	40	212	105
150	36	219	110
150	40	220	95
151	34	221	120
155	38	232	135
155	42		

APPENDIX 5

LENGTH AND WEIGHT OF BROWN TROUT CAUGHT IN BIG GRIZZLY CREEK, 1988

Fork Length (mm)	Displacement (ml)
83	6
86	7
93	10
100	12
103	11
110	13
164	42
180	58
186	66
289	230